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# TABLE OF ROTATION SEQUENCE OF $X_{n+1} = X_n^2 - \lambda$

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TABLE OF ROTATION SEQUENCES OF  $x_{n+1} = x_n^2 - \lambda$ 

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## ABSTRACT

Symbolic table is presented for the periodic orbits of the iterates of  $x_{n+1} = x_n^2 - \lambda$ . This provides some useful informations about the periodic points in the Smale's horseshoe map and will be applied to the bifurcation problems of periodic points in the Hénon map.

## 1. INTRODUCTION

This note provides only a table of rotation sequences correlated with the periodic orbits in a map:

$$f: \mathbb{R} \rightarrow \mathbb{R}; x \rightarrow f(x) = x^2 - \lambda \quad (1)$$

where  $\lambda$  is a real parameter. Since Myrberg's pioneering work [1], many authors discuss about the iterations of (1), see for example [2][3]. For  $\lambda > 2$  all possible periodic points of (1) are generated. Hence there exists an isomorphism of periodic points between the Smale's horseshoe map and the map (1). The periodic points of (1) can be naturally imbedded in a horseshoe rectangle region. This fact is effectively used for the discussion of the bifurcation problems of the periodic points in the Hénon map[4][5].

Combinatorial algorithm for obtaining the rotation sequence is reported in [6]. The algorithm can be easily implemented in a small computer. Tables and imbedded figures of the rotation sequences are illustrated in [7]. Listings of computer program in Basic are also found in [7].

## 2. NOTATIONS

There are many notations and symbols to specify the periodic orbits of (1)[2][3]. Here we show the symbols used in our table in §3 by an illustrated example of a 6-periodic orbit with the multiplier  $S = 0$ , called a critical orbit, shown in Fig. 1. The periodic points are numbered consecutively in decimal with the increasing order of  $x$ . By the iteration of (1), the point 1 moves as follows:

$$1 \rightarrow 6 \rightarrow 4 \rightarrow 2 \rightarrow 5 \rightarrow 3 \rightarrow 1 \quad (2)$$

The decimal sequence of the orbit is then expressed by  $[d] = 164253$ . Note that the point 3 lies on the minimum point  $x = 0$ . Assigning + sign to the points 4, 5, 6 and - sign to 1, 2, and starting from the point 1, we obtain a binary sequence  $[-++-+]$ , where the sign does not assign to the point 3. In this sequence the first symbol is always - sign so that omitting it Myrberg introduced the binary rotation sequence  $[r] = [++-+]$ , which we call the rotation sequence of Myrberg. Note that the value of the parameter  $\lambda$  giving  $S = 0$  is called the critical value of  $\lambda$ . Note also that the alphabet  $\{-, +\}$  is written by  $\{L, R\}$  in [3].

From the rotation sequence of Myrberg  $[r]$  we obtain two kinds of noncritical rotation sequences:  $[++-+]$  and  $[++-+]$ , where the last sign + or - is attached to  $[r]$ . This corresponds to the splitting of the point 3 into the positive or negative direction of  $x$ . The rotation sequences are also rewritten by the alphabet  $\{1, 0\}$ :

$$a_0 = [1001001], a_1 = [1001011] \quad (3)$$

where we write down full symbols with 6 bits, that is the first and last signs are attached to  $[r]$  with  $\{1, 0\}$ .

Now if we consider the standard shift transformation applied to the repeated sequences of (3):  $\cdots aa.aa \cdots$ , the periodic points of (3) can be easily imbedded in a horseshoe rectangle as illustrated in Fig. 2, where the point moves along the directional segment by the horseshoe map. Note that the rectangle is symbolically coordinated by the binary numbers shown in Fig. 3. The rotation sequence imbedded in the rect-

angle is called *symmetric* if the orbit is symmetric with respect to the diagonal line shown in Fig. 3. If a rotation sequence is dissymmetric, then there exists another dissymmetric sequence called the adjoint sequence. They have a symmetric property with respect to the diagonal line in Fig. 3.

Finally a periodic point in the rectangle is directly unstable if  $0 < S_1 < 1 < S_2$ , and is inversely unstable if  $S_1 < -1 < S_2 < 0$ , where  $S_1$  and  $S_2$  denote the multiplier of the periodic point.

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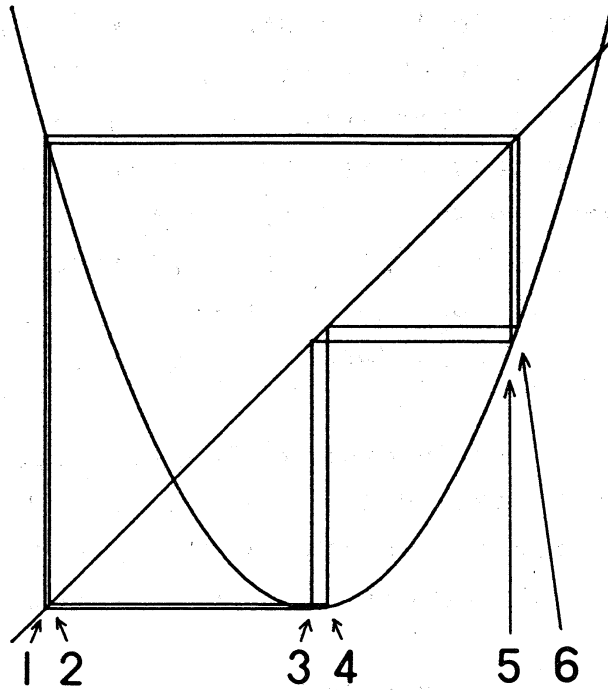
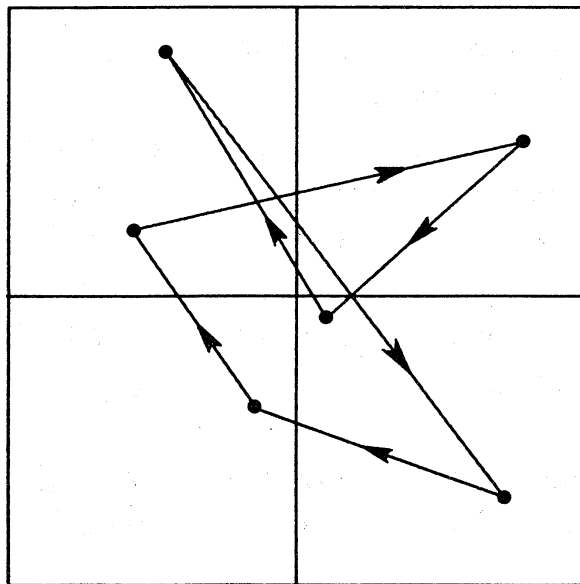
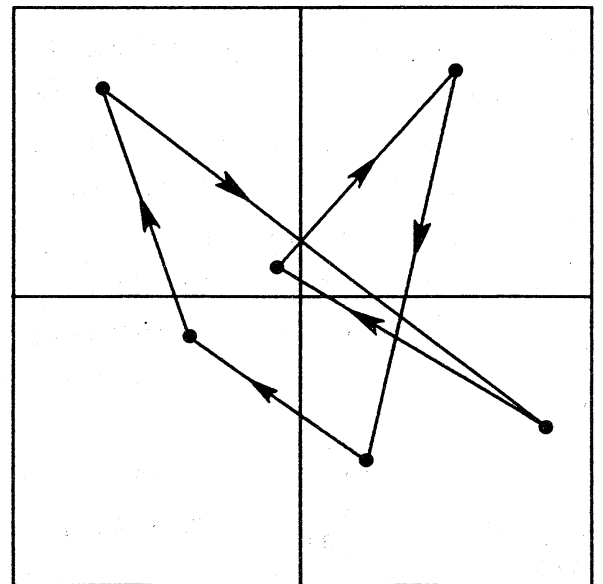


Fig. 1. Example of a critical 6-periodic orbit.  
 $\lambda = 1.77289\dots$



(2) 1 6 4 2 5 3 [100101]

(a)



(3) 1 6 5 3 2 4 [100110]

(b)

Fig. 2. An imbedded dissymmetric orbit (a) and its adjoint (b).

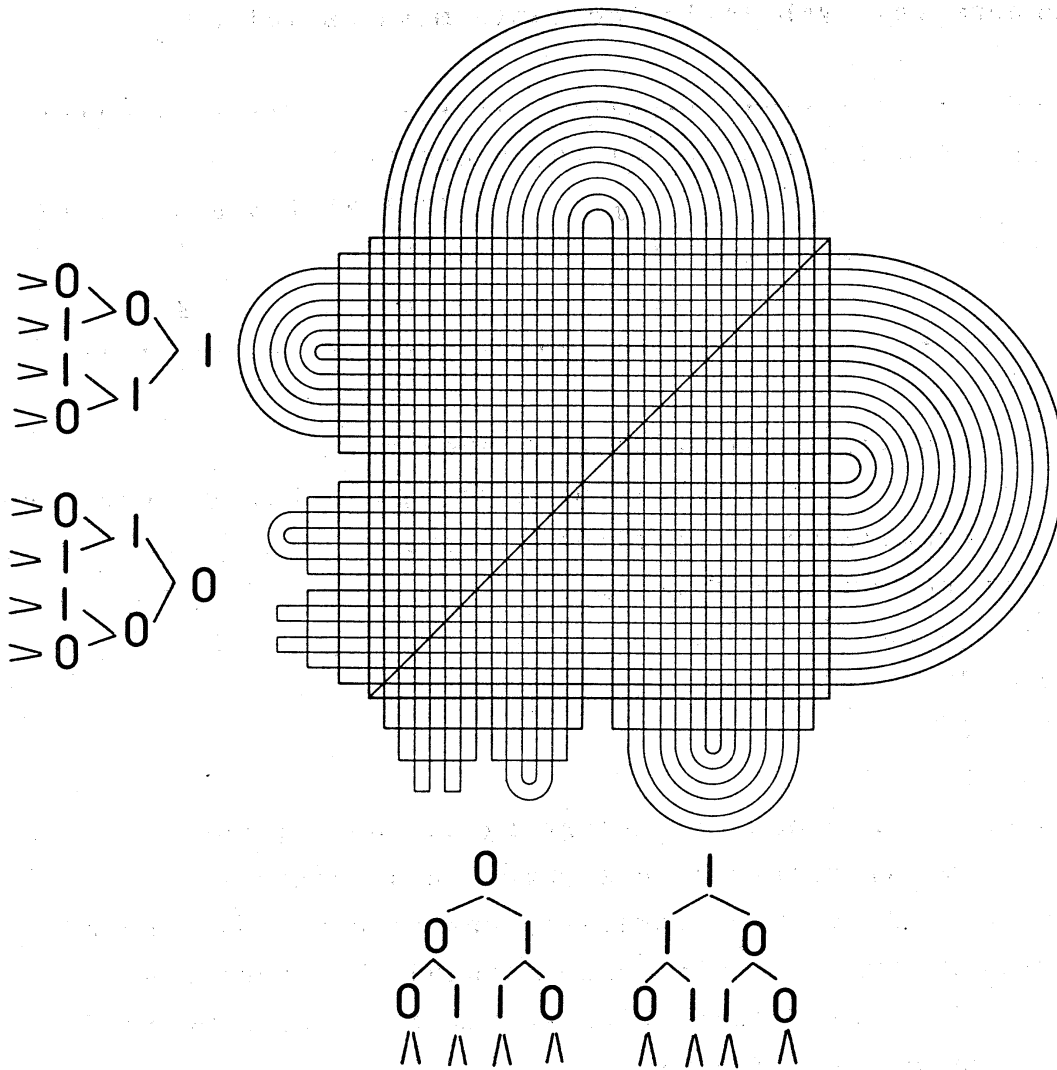


Fig. 3. Horseshoe rectangle and its binary coordinate.

### 3. TABLE OF ROTATION SEQUENCES

Numbers and symbols in the table mean as follows:

.....

2    1.77289    1 6 4 2 5 3 [++-+] 10010 0(S-D-2)

1(D-I-2) 1 6 5 3 2 4 (3)

↑                 ↑                 ↑                 ↑                 ↑                 ↑

a                 b                 c                 d                 e                 f                 g

.....

- a: consecutive number of rotation sequence.
- b: critical value  $\lambda$  for obtaining Myrberg's rotation sequence.
- c: decimal expression of rotation sequence.
- d: rotation sequence of Myrberg.
- e: binary expression of (3).
- f: 0 ( S - D - 2 )
- ↑    ↑    ↑    ↑
- $f_1$     $f_2$     $f_3$     $f_4$
- $f_1$ : 0 or 1: the last bit assigning to the expression (e).
- $f_2$ : S or D: symmetric or dissymmetric sequence.
- $f_3$ : D or I: directly or inversely unstable periodic point.
- $f_4$ : winding number of the orbit around the inversely unstable fixed point corresponding to the repeated sequence  $\cdots 1111.1111 \cdots$ .
- g: adjoint sequence when the sequence is dissymmetric.

----- Order of rotation sequence = 3 , Number of rotation sequences = 1 -----

1 1.75487 1 3 2[+]10 0(S-I-1) 1(S-D-1)

----- Order of rotation sequence = 4 , Number of rotation sequences = 2 -----

1 1.3107 1 4 2 3[+-]101 0(S-D-2) 1(S-I-2)  
2 1.9408 1 4 3 2[++]100 0(S-I-1) 1(S-D-1)

----- Order of rotation sequence = 5 , Number of rotation sequences = 3 -----

1 1.62541 1 5 3 2 4[+--]1011 0(S-I-2) 1(S-D-2)  
2 1.86078 1 5 4 2 3[+-]1001 0(S-D-2) 1(S-I-2)  
3 1.98542 1 5 4 3 2[+++]1000 0(S-I-1) 1(S-D-1)

----- Order of rotation sequence = 6 , Number of rotation sequences = 5 -----

1 1.47601 1 6 3 4 2 5[+---]10111 0(S-D-3) 1(S-I-3)  
2 1.77289 1 6 4 2 5 3[++-]10010 0(S-D-2)  
1(D-I-2) 1 6 5 3 2 4 ( 3 )  
3 1.90728 1 6 5 3 2 4[+-]10011 0(D-I-2) 1 6 4 2 5 3 ( 2 )  
1(S-D-2)  
4 1.96677 1 6 5 4 2 3[+++]10001 0(S-D-2) 1(S-I-2)  
5 1.99638 1 6 5 4 3 2[++++]10000 0(S-I-1) 1(S-D-1)

----- Order of rotation sequence = 7 , Number of rotation sequences = 9 -----

1 1.57489 1 7 4 3 5 2 6[+----]101111 0(S-I-3) 1(S-D-3)  
2 1.67407 1 7 4 2 6 3 5[+---]101101 0(S-D-3) 1(S-I-3)  
3 1.83232 1 7 5 2 6 3 4[+-+--]100101 0(S-I-3)  
1(D-D-3) 1 7 6 3 4 2 5 ( 4 )  
4 1.8848 1 7 6 3 4 2 5[+----]100111 0(D-D-3) 1 7 5 2 6 3 4 ( 3 )  
1(S-I-3)  
5 1.92715 1 7 5 3 2 6 4[+---]100110 0(S-I-2) 1(S-D-2)  
6 1.95371 1 7 6 4 2 5 3[+++--]100010 0(S-D-2)  
1(D-I-2) 1 7 6 5 3 2 4 ( 7 )  
7 1.97718 1 7 6 5 3 2 4[+++--]100011 0(D-I-2) 1 7 6 4 2 5 3 ( 6 )  
1(S-D-2)  
8 1.99181 1 7 6 5 4 2 3[++++-]100001 0(S-D-2) 1(S-I-2)  
9 1.9991 1 7 6 5 4 3 2[+++++]100000 0(S-I-1) 1(S-D-1)

----- Order of rotation sequence = 8 , Number of rotation sequences = 16 -----

1 1.38155 1 8 4 5 2 7 3 6[+---+--]1011101 0(S-I-4) 1(S-D-4)  
2 1.52182 1 8 4 5 3 6 2 7[+----]1011111 0(S-D-4) 1(S-I-4)  
3 1.71108 1 8 5 2 7 4 3 6[+---]1011011 0(S-I-3) 1(S-D-3)  
4 1.81 1 8 6 2 7 4 3 5[+-+--]1001011 0(S-D-3)  
1(D-I-3) 1 8 7 4 3 5 2 6 ( 7 )  
5 1.85173 1 8 6 3 5 2 7 4[+-+--]1001010 0(S-I-3)  
1(D-D-3) 1 8 7 4 2 6 3 5 ( 8 )  
6 1.87 1 8 6 3 4 2 7 5[+----]1001110 0(S-D-3)  
1(D-I-3) 1 8 7 4 2 6 3 5 ( 8 )  
7 1.89692 1 8 7 4 3 5 2 6[+----]1001111 0(D-I-3) 1 8 6 2 7 4 3 5 ( 4 )  
1(S-D-3)



8 1.9171 1 8 7 4 2 6 3 5[+---+ ]1001101 0(D-D-3) 1 8 6 3 5 2 7 4 ( 5 )  
 1(D-I-3) 1 8 6 3 4 2 7 5 ( 6 )  
 9 1.94178 1 8 6 4 2 7 5 3[+++ + ]1000100 0(S-D-2)  
 1(D-I-2) 1 8 7 5 3 2 6 4 ( 12 )  
 10 1.96076 1 8 7 5 2 6 3 4[+++ + ]1000101 0(S-I-3)  
 1(D-D-3) 1 8 7 6 3 4 2 5 ( 11 )  
 11 1.9722 1 8 7 6 3 4 2 5[+++ - ]1000111 0(D-D-3) 1 8 7 5 2 6 3 4 ( 10 )  
 1(S-I-3)  
 12 1.98166 1 8 7 5 3 2 6 4[+++ + ]1000110 0(D-I-2) 1 8 6 4 2 7 5 3 ( 9 )  
 1(S-D-2)  
 13 1.98879 1 8 7 6 4 2 5 3[++++ + ]1000010 0(S-D-2)  
 1(D-I-2) 1 8 7 6 5 3 2 4 ( 14 )  
 14 1.99433 1 8 7 6 5 3 2 4[++++ - ]1000011 0(D-I-2) 1 8 7 6 4 2 5 3 ( 13 )  
 1(S-D-2)  
 15 1.99796 1 8 7 6 5 4 2 3[++++ + ]1000001 0(S-D-2) 1(S-I-2)  
 16 1.99977 1 8 7 6 5 4 3 2[++++ + ]1000000 0(S-I-1) 1(S-D-1)

----- Order of rotation sequence = 9 , Number of rotation sequences = 28 -----

1 1.55528 1 9 5 4 6 3 7 2 8[+-----]10111111 0(S-I-4) 1(S-D-4)  
 2 1.59568 1 9 5 4 6 2 8 3 7[+-----]10111101 0(S-D-4) 1(S-I-4)  
 3 1.65613 1 9 5 3 7 2 8 4 6[+---+ ]10110101 0(S-I-4)  
 1(D-D-4) 1 9 6 2 8 4 5 3 7 ( 4 )  
 4 1.69014 1 9 6 2 8 4 5 3 7[+---+ ]10110111 0(D-D-4) 1 9 5 3 7 2 8 4 6 ( 3 )  
 1(S-I-4)  
 5 1.78587 1 9 6 3 7 4 2 8 5[+++ + ]10010110 0(D-D-3) 1 9 7 4 3 6 2 8 5 ( 11 )  
 1(D-I-3) 1 9 8 5 2 7 4 3 6 ( 12 )  
 6 1.82276 1 9 7 2 8 4 5 3 6[+++ + ]10010111 0(S-I-4)  
 1(D-D-4) 1 9 8 4 5 3 6 2 7 ( 9 )  
 7 1.84129 1 9 7 3 6 2 8 4 5[+++ + ]10010101 0(S-D-4)  
 1(D-I-4) 1 9 8 4 5 2 7 3 6 ( 8 )  
 8 1.87838 1 9 8 4 5 2 7 3 6[+++ + ]10011101 0(D-I-4) 1 9 7 3 6 2 8 4 5 ( 7 )  
 1(S-D-4)  
 9 1.89078 1 9 8 4 5 3 6 2 7[+-----]10011111 0(D-D-4) 1 9 7 2 8 4 5 3 6 ( 6 )  
 1(S-I-4)  
 10 1.90312 1 9 7 4 3 5 2 8 6[+++ + ]10011110 0(S-I-3)  
 1(D-D-3) 1 9 8 5 2 7 4 3 6 ( 12 )  
 11 1.91144 1 9 7 4 3 6 2 8 5[+++ + ]10011010 0(D-D-3) 1 9 6 3 7 4 2 8 5 ( 5 )  
 1(S-I-3)  
 12 1.92229 1 9 8 5 2 7 4 3 6[+++ + ]10011011 0(D-I-3) 1 9 6 3 7 4 2 8 5 ( 5 )  
 1(D-D-3) 1 9 7 4 3 5 2 8 6 ( 10 )  
 13 1.93224 1 9 7 4 2 8 6 3 5[+++ + ]10011001 0(S-D-3) 1(S-I-3)  
 14 1.94958 1 9 7 5 2 8 6 3 4[+++ + ]10001001 0(D-I-3) 1 9 8 6 3 5 2 7 4 ( 16 )  
 1(D-D-3) 1 9 8 6 3 4 2 7 5 ( 17 )  
 15 1.95733 1 9 8 6 2 7 4 3 5[+++ + ]10001011 0(S-D-3)  
 1(D-I-3) 1 9 8 7 4 3 5 2 6 ( 18 )  
 16 1.96402 1 9 8 6 3 5 2 7 4[+++ + ]10001010 0(D-I-3) 1 9 7 5 2 8 6 3 4 ( 14 )  
 1(D-D-3) 1 9 8 7 4 2 6 3 5 ( 19 )  
 17 1.96942 1 9 8 6 3 4 2 7 5[+++ + ]10001110 0(D-D-3) 1 9 7 5 2 8 6 3 4 ( 14 )  
 1(D-I-3) 1 9 8 7 4 2 6 3 5 ( 19 )  
 18 1.97478 1 9 8 7 4 3 5 2 6[+++ + ]10001111 0(D-I-3) 1 9 8 6 2 7 4 3 5 ( 15 )  
 1(S-D-3)  
 19 1.97946 1 9 8 7 4 2 6 3 5[+++ + ]10001101 0(D-D-3) 1 9 8 6 3 5 2 7 4 ( 16 )  
 1(D-I-3) 1 9 8 6 3 4 2 7 5 ( 17 )



22	1.93539	1 10 8 5 2 9 7 4 3 6[+++----]100110011	0(D-I-3) 1 10 7 4 2 9 6 3 8 5 ( 21 ) 1(S-D-3)
23	1.94687	1 10 8 6 2 9 7 4 3 5[+++----]100010011	0(D-D-3) 1 10 9 6 3 7 4 2 8 5 ( 25 ) 1(D-I-3) 1 10 9 7 4 3 5 2 8 6 ( 32 )
24	1.9519	1 10 8 5 2 9 6 3 7 4[+++----]100010010	0(S-I-3) 1(D-D-3) 1 10 9 7 4 3 6 2 8 5 ( 33 )
25	1.95542	1 10 9 6 3 7 4 2 8 5[+++----]100010110	0(D-D-3) 1 10 8 6 2 9 7 4 3 5 ( 23 ) 1(D-I-3) 1 10 9 8 5 2 7 4 3 6 ( 34 )
26	1.9591	1 10 9 7 2 8 4 5 3 6[+++----]100010111	0(S-I-4) 1(D-D-4) 1 10 9 8 4 5 3 6 2 7 ( 31 )
27	1.96238	1 10 9 7 3 6 2 8 4 5[+++----]100010101	0(S-D-4) 1(D-I-4) 1 10 9 8 4 5 2 7 3 6 ( 30 )
28	1.96582	1 10 8 6 3 5 2 9 7 4[+++----]100010100	0(S-I-3) 1(D-D-3) 1 10 9 7 4 2 8 6 3 5 ( 35 )
29	1.96774	1 10 8 6 3 4 2 9 7 5[+++----]100011100	0(S-D-3) 1(D-I-3) 1 10 9 7 4 2 8 6 3 5 ( 35 )
30	1.97086	1 10 9 8 4 5 2 7 3 6[+++----]100011101	0(D-I-4) 1 10 9 7 3 6 2 8 4 5 ( 27 ) 1(S-D-4)
31	1.9735	1 10 9 8 4 5 3 6 2 7[+++----]100011111	0(D-D-4) 1 10 9 7 2 8 4 5 3 6 ( 26 ) 1(S-I-4)
32	1.97604	1 10 9 7 4 3 5 2 8 6[+++----]100011110	0(D-I-3) 1 10 8 6 2 9 7 4 3 5 ( 23 ) 1(D-D-3) 1 10 9 8 5 2 7 4 3 6 ( 34 )
33	1.97829	1 10 9 7 4 3 6 2 8 5[+++----]100011010	0(D-D-3) 1 10 8 5 2 9 6 3 7 4 ( 24 ) 1(S-I-3)
34	1.98058	1 10 9 8 5 2 7 4 3 6[+++----]100011011	0(D-I-3) 1 10 9 6 3 7 4 2 8 5 ( 25 ) 1(D-D-3) 1 10 9 7 4 3 5 2 8 6 ( 32 )
35	1.98272	1 10 9 7 4 2 8 6 3 5[+++----]100011001	0(D-D-3) 1 10 8 6 3 5 2 9 7 4 ( 28 ) 1(D-I-3) 1 10 8 6 3 4 2 9 7 5 ( 29 )
36	1.98548	1 10 8 6 4 2 9 7 5 3[+++++]100001000	0(S-D-2) 1(D-I-2) 1 10 9 7 5 3 2 8 6 4 ( 43 )
37	1.98794	1 10 9 7 5 2 8 6 3 4[+++++]100001001	0(D-I-3) 1 10 9 8 6 3 5 2 7 4 ( 39 ) 1(D-D-3) 1 10 9 8 6 3 4 2 7 5 ( 40 )
38	1.9896	1 10 9 8 6 2 7 4 3 5[+++++]100001011	0(S-D-3) 1(D-I-3) 1 10 9 8 7 4 3 5 2 6 ( 41 )
39	1.99112	1 10 9 8 6 3 5 2 7 4[+++++]100001010	0(D-I-3) 1 10 9 7 5 2 8 6 3 4 ( 37 ) 1(D-D-3) 1 10 9 8 7 4 2 6 3 5 ( 42 )
40	1.99248	1 10 9 8 6 3 4 2 7 5[+++++]100001110	0(D-D-3) 1 10 9 7 5 2 8 6 3 4 ( 37 ) 1(D-I-3) 1 10 9 8 7 4 2 6 3 5 ( 42 )
41	1.99375	1 10 9 8 7 4 3 5 2 6[+++++]100001111	0(D-I-3) 1 10 9 8 6 2 7 4 3 5 ( 38 ) 1(S-D-3)
42	1.99489	1 10 9 8 7 4 2 6 3 5[+++++]100001101	0(D-D-3) 1 10 9 8 6 3 5 2 7 4 ( 39 ) 1(D-I-3) 1 10 9 8 6 3 4 2 7 5 ( 40 )
43	1.99592	1 10 9 7 5 3 2 8 6 4[+++++]100001100	0(D-I-2) 1 10 8 6 4 2 9 7 5 3 ( 36 ) 1(S-D-2)
44	1.9968	1 10 9 8 6 4 2 7 5 3[+++++]100000100	0(S-D-2) 1(D-I-2) 1 10 9 8 7 5 3 2 6 4 ( 47 )
45	1.99761	1 10 9 8 7 5 2 6 3 4[+++++]100000101	0(S-I-3) 1(D-D-3) 1 10 9 8 7 6 3 4 2 5 ( 46 )
46	1.99829	1 10 9 8 7 6 3 4 2 5[+++++]100000111	0(D-D-3) 1 10 9 8 7 5 2 6 3 4 ( 45 ) 1(S-I-3)
47	1.99886	1 10 9 8 7 5 3 2 6 4[+++++]100000110	0(D-I-2) 1 10 9 8 6 4 2 7 5 3 ( 44 ) 1(S-D-2)
48	1.99931	1 10 9 8 7 6 4 2 5 3[+++++]100000010	0(S-D-2) 1(D-I-2) 1 10 9 8 7 6 5 3 2 4 ( 49 )

49 1.99965 1 10 9 8 7 6 5 3 2 4[+++++--]100000011 0(D-I-2) 1 10 9 8 7 6 4 2 5 3 ( 48 )  
 1(S-D-2)  
 50 1.99987 1 10 9 8 7 6 5 4 2 3[+++++--]100000001 0(S-D-2) 1(S-I-2)  
 51 1.99999 1 10 9 8 7 6 5 4 3 2[+++++--]100000000 0(S-I-1) 1(S-D-1)

----- Order of rotation sequence = 11 , Number of rotation sequences = 93 -----

1 1.5479 1 11 6 5 7 4 8 3 9 2 10[+-----]101111111 0(S-I-5) 1(S-D-5)  
 2 1.56363 1 11 6 5 7 4 8 2 10 3 9[+-----+--]101111110 0(S-D-5) 1(S-I-5)  
 3 1.5868 1 11 6 5 7 3 9 2 10 4 8[+-----+--]101111010 0(S-I-5)  
 1(D-D-5) 1 11 6 4 8 2 10 5 7 3 9 ( 4 )  
 4 1.60431 1 11 6 4 8 2 10 5 7 3 9[+-----+--]101111011 0(D-D-5) 1 11 6 5 7 3 9 2 10 4 8 ( 3 )  
 1(S-I-5)  
 5 1.64871 1 11 7 3 9 2 10 5 6 4 8[+-----+--]101101011 0(S-I-5)  
 1(D-D-5) 1 11 8 2 10 5 6 4 7 3 9 ( 8 )  
 6 1.66311 1 11 6 3 9 4 8 2 10 5 7[+-----+--]101101010 0(S-D-5)  
 1(D-I-5) 1 11 7 2 10 5 6 3 9 4 8 ( 7 )  
 7 1.68452 1 11 7 2 10 5 6 3 9 4 8[+-----+--]101101101 0(D-I-5) 1 11 6 3 9 4 8 2 10 5 7 ( 6 )  
 1(S-D-5)  
 8 1.69524 1 11 8 2 10 5 6 4 7 3 9[+-----+--]101101111 0(D-D-5) 1 11 7 3 9 2 10 5 6 4 8 ( 5 )  
 1(S-I-5)  
 9 1.73201 1 11 7 2 10 6 3 9 5 4 8[+-----+--]101101101 0(S-I-4) 1(S-D-4)  
 10 1.79606 1 11 8 2 10 6 3 9 5 4 7[+-----+--]100101101 0(S-D-4)  
 1(D-I-4) 1 11 9 5 4 7 2 10 6 3 8 ( 27 )  
 11 1.80821 1 11 8 3 9 5 4 7 2 10 6[+-----+--]100101101 0(S-I-4)  
 1(D-D-4) 1 11 10 6 3 8 2 9 5 4 7 ( 30 )  
 12 1.81177 1 11 8 3 9 5 4 6 2 10 7[+-----+--]100101110 0(D-D-4) 1 11 9 5 4 6 3 8 2 10 7 ( 26 )  
 1(D-I-4) 1 11 10 7 2 9 5 4 6 3 8 ( 33 )  
 13 1.81982 1 11 9 2 10 5 6 4 7 3 8[+-----+--]100101111 0(S-I-5)  
 1(D-D-5) 1 11 10 5 6 4 7 3 8 2 9 ( 24 )  
 14 1.8257 1 11 8 2 10 5 6 3 9 4 7[+-----+--]100101101 0(D-D-5) 1 11 9 3 8 2 10 5 6 4 7 ( 16 )  
 1(D-I-5) 1 11 9 4 7 2 10 5 6 3 8 ( 21 )  
 15 1.83868 1 11 8 3 9 4 7 2 10 5 6[+-----+--]100101010 0(S-I-5)  
 1(D-D-5) 1 11 10 5 6 3 8 2 9 4 7 ( 22 )  
 16 1.8438 1 11 9 3 8 2 10 5 6 4 7[+-----+--]100101011 0(D-D-5) 1 11 8 2 10 5 6 3 9 4 7 ( 14 )  
 1(D-I-5) 1 11 10 5 6 4 7 2 9 3 8 ( 23 )  
 17 1.84992 1 11 8 4 7 3 9 5 2 10 6[+-----+--]100101010 0(D-I-4) 1 11 9 5 3 8 4 7 2 10 6 ( 31 )  
 1(D-D-4) 1 11 10 6 2 9 5 3 8 4 7 ( 34 )  
 18 1.85376 1 11 8 4 6 2 10 7 3 9 5[+-----+--]100101001 0(S-D-4)  
 1(D-I-4) 1 11 9 5 3 7 2 10 8 4 6 ( 29 )  
 19 1.86808 1 11 8 4 5 2 10 7 3 9 6[+-----+--]100111001 0(S-I-4)  
 1(D-D-4) 1 11 9 5 3 7 2 10 8 4 6 ( 29 )  
 20 1.87171 1 11 8 4 5 3 9 6 2 10 7[+-----+--]100111010 0(D-D-4) 1 11 9 5 3 8 4 6 2 10 7 ( 32 )  
 1(D-I-4) 1 11 10 6 2 9 5 3 8 4 7 ( 34 )  
 21 1.87649 1 11 9 4 7 2 10 5 6 3 8[+-----+--]100111011 0(D-I-5) 1 11 8 2 10 5 6 3 9 4 7 ( 14 )  
 1(D-D-5) 1 11 10 5 6 4 7 2 9 3 8 ( 23 )  
 22 1.88025 1 11 10 5 6 3 8 2 9 4 7[+-----+--]100111010 0(D-D-5) 1 11 8 3 9 4 7 2 10 5 6 ( 15 )  
 1(S-I-5)  
 23 1.88915 1 11 10 5 6 4 7 2 9 3 8[+-----+--]100111101 0(D-I-5) 1 11 9 3 8 2 10 5 6 4 7 ( 16 )  
 1(D-D-5) 1 11 9 4 7 2 10 5 6 3 8 ( 21 )  
 24 1.89234 1 11 10 5 6 4 7 3 8 2 9[+-----+--]100111111 0(D-D-5) 1 11 9 2 10 5 6 4 7 3 8 ( 13 )  
 1(S-I-5)  
 25 1.89575 1 11 9 5 4 6 3 7 2 10 8[+-----+--]100111110 0(S-I-4)  
 1(D-D-4) 1 11 10 7 2 9 5 4 6 3 8 ( 33 )

26 1.89809 1 11 9 5 4 6 3 8 2 10 7[+-----+]1001111010 0(D-D-4) 1 11 8 3 9 5 4 6 2 10 7 ( 12 )  
 1(D-I-4) 1 11 10 6 3 8 2 9 5 4 7 ( 30 )  
 27 1.90149 1 11 9 5 4 7 2 10 6 3 8[+-----+]1001111011 0(D-I-4) 1 11 8 2 10 6 3 9 5 4 7 ( 10 )  
 1(S-D-4)  
 28 1.90503 1 11 9 5 4 6 2 10 8 3 7[+-----+]1001111001 0(S-D-4) 1(S-I-4)  
 29 1.90961 1 11 9 5 3 7 2 10 8 4 6[+-----+]1001101001 0(D-I-4) 1 11 8 4 6 2 10 7 3 9 5 ( 18 )  
 1(D-D-4) 1 11 8 4 5 2 10 7 3 9 6 ( 19 )  
 30 1.91297 1 11 10 6 3 8 2 9 5 4 7[+-----+]1001101011 0(D-D-4) 1 11 8 3 9 5 4 7 2 10 6 ( 11 )  
 1(D-I-4) 1 11 9 5 4 6 3 8 2 10 7 ( 26 )  
 31 1.916 1 11 9 5 3 8 4 7 2 10 6[+-----+]1001101010 0(D-I-4) 1 11 8 4 7 3 9 5 2 10 6 ( 17 )  
 1(S-D-4)  
 32 1.91819 1 11 9 5 3 8 4 6 2 10 7[+-----+]1001101110 0(D-D-4) 1 11 8 4 5 3 9 6 2 10 7 ( 20 )  
 1(S-I-4)  
 33 1.921 1 11 10 7 2 9 5 4 6 3 8[+-----+]1001101111 0(D-I-4) 1 11 8 3 9 5 4 6 2 10 7 ( 12 )  
 1(D-D-4) 1 11 9 5 4 6 3 7 2 10 8 ( 25 )  
 34 1.92359 1 11 10 6 2 9 5 3 8 4 7[+-----+]1001101101 0(D-D-4) 1 11 8 4 7 3 9 5 2 10 6 ( 17 )  
 1(D-I-4) 1 11 8 4 5 3 9 6 2 10 7 ( 20 )  
 35 1.93083 1 11 9 5 2 10 7 3 8 4 6[+-----+]1001100101 0(S-I-4)  
 1(D-D-4) 1 11 9 6 2 10 8 4 5 3 7 ( 36 )  
 36 1.93371 1 11 9 6 2 10 8 4 5 3 7[+-----+]1001100111 0(D-D-4) 1 11 9 5 2 10 7 3 8 4 6 ( 35 )  
 1(S-I-4)  
 37 1.93749 1 11 8 5 2 10 7 4 3 9 6[+-----+]1001100110 0(S-I-3) 1(S-D-3)  
 38 1.94499 1 11 9 6 2 10 7 4 3 8 5[+-----+]1000100110 0(S-D-3)  
 1(D-I-3) 1 11 10 7 4 3 8 5 2 9 6 ( 59 )  
 39 1.94833 1 11 9 7 2 10 8 4 5 3 6[+-----+]1000100111 0(D-I-4) 1 11 10 7 3 8 4 5 2 9 6 ( 45 )  
 1(D-D-4) 1 11 10 8 4 5 3 6 2 9 7 ( 52 )  
 40 1.95074 1 11 9 6 2 10 7 3 8 4 5[+-----+]1000100101 0(D-D-4) 1 11 10 7 3 8 4 6 2 9 5 ( 46 )  
 1(D-I-4) 1 11 10 8 4 5 3 7 2 9 6 ( 51 )  
 41 1.95326 1 11 9 6 3 8 5 2 10 7 4[+-----+]1000100100 0(S-I-3)  
 1(D-D-3) 1 11 10 7 4 2 9 6 3 8 5 ( 60 )  
 42 1.95417 1 11 9 6 3 7 4 2 10 8 5[+-----+]1000101100 0(D-D-3) 1 11 9 7 4 3 6 2 10 8 5 ( 56 )  
 1(D-I-3) 1 11 10 8 5 2 9 7 4 3 6 ( 61 )  
 43 1.95641 1 11 10 7 2 9 5 3 8 4 6[+-----+]1000101101 0(D-I-4) 1 11 10 8 3 7 2 9 5 4 6 ( 47 )  
 1(D-D-4) 1 11 10 8 4 6 2 9 5 3 7 ( 50 )  
 44 1.95821 1 11 10 8 2 9 5 4 6 3 7[+-----+]1000101111 0(S-D-4)  
 1(D-I-4) 1 11 10 9 5 4 6 3 7 2 8 ( 53 )  
 45 1.95999 1 11 10 7 3 8 4 5 2 9 6[+-----+]1000101110 0(D-I-4) 1 11 9 7 2 10 8 4 5 3 6 ( 39 )  
 1(D-D-4) 1 11 10 9 6 2 8 4 5 3 7 ( 58 )  
 46 1.96152 1 11 10 7 3 8 4 6 2 9 5[+-----+]1000101010 0(D-D-4) 1 11 9 6 2 10 7 3 8 4 5 ( 40 )  
 1(D-I-4) 1 11 10 9 5 3 7 2 8 4 6 ( 57 )  
 47 1.96321 1 11 10 8 3 7 2 9 5 4 6[+-----+]1000101011 0(D-I-4) 1 11 10 7 2 9 5 3 8 4 6 ( 43 )  
 1(D-D-4) 1 11 10 9 5 4 6 2 8 3 7 ( 54 )  
 48 1.96486 1 11 9 7 3 6 2 10 8 4 5[+-----+]1000101001 0(S-D-4)  
 1(D-I-4) 1 11 10 8 4 5 2 9 7 3 6 ( 49 )  
 49 1.96865 1 11 10 8 4 5 2 9 7 3 6[+-----+]1000111001 0(D-I-4) 1 11 9 7 3 6 2 10 8 4 5 ( 48 )  
 1(S-D-4)  
 50 1.97014 1 11 10 8 4 6 2 9 5 3 7[+-----+]1000111011 0(D-D-4) 1 11 10 7 2 9 5 3 8 4 6 ( 43 )  
 1(D-I-4) 1 11 10 9 5 4 6 2 8 3 7 ( 54 )  
 51 1.97157 1 11 10 8 4 5 3 7 2 9 6[+-----+]1000111010 0(D-I-4) 1 11 9 6 2 10 7 3 8 4 5 ( 40 )  
 1(D-D-4) 1 11 10 9 5 3 7 2 8 4 6 ( 57 )  
 52 1.97283 1 11 10 8 4 5 3 6 2 9 7[+-----+]1000111110 0(D-D-4) 1 11 9 7 2 10 8 4 5 3 6 ( 39 )  
 1(D-I-4) 1 11 10 9 6 2 8 4 5 3 7 ( 58 )  
 53 1.97415 1 11 10 9 5 4 6 3 7 2 8[+-----+]1000111111 0(D-I-4) 1 11 10 8 2 9 5 4 6 3 7 ( 44 )  
 1(S-D-4)

54 1.97541 1 11 10 9 5 4 6 2 8 3 7[++++---+]-1000111101 0(D-D-4) 1 11 10 8 3 7 2 9 5 4 6 ( 47 )  
 1(D-I-4) 1 11 10 8 4 6 2 9 5 3 7 ( 50 )  
 55 1.97672 1 11 9 7 4 3 5 2 10 8 6[++++---+]-1000111100 0(S-I-3)  
 1(D-D-3) 1 11 10 8 5 2 9 7 4 3 6 ( 61 )  
 56 1.97764 1 11 9 7 4 3 6 2 10 8 5[++++---+]-1000110100 0(D-D-3) 1 11 9 6 3 7 4 2 10 8 5 ( 42 )  
 1(D-I-3) 1 11 10 7 4 2 9 6 3 8 5 ( 60 )  
 57 1.97889 1 11 10 9 5 3 7 2 8 4 6[++++---+]-1000110101 0(D-I-4) 1 11 10 7 3 8 4 6 2 9 5 ( 46 )  
 1(D-D-4) 1 11 10 8 4 5 3 7 2 9 6 ( 51 )  
 58 1.98002 1 11 10 9 6 2 8 4 5 3 7[++++---+]-1000110111 0(D-D-4) 1 11 10 7 3 8 4 5 2 9 6 ( 45 )  
 1(D-I-4) 1 11 10 8 4 5 3 6 2 9 7 ( 52 )  
 59 1.98114 1 11 10 7 4 3 8 5 2 9 6[++++---+]-1000110110 0(D-I-3) 1 11 9 6 2 10 7 4 3 8 5 ( 38 )  
 1(S-D-3)  
 60 1.98217 1 11 10 7 4 2 9 6 3 8 5[++++---+]-1000110010 0(D-D-3) 1 11 9 6 3 8 5 2 10 7 4 ( 41 )  
 1(D-I-3) 1 11 9 7 4 3 6 2 10 8 5 ( 56 )  
 61 1.98326 1 11 10 8 5 2 9 7 4 3 6[++++---+]-1000110011 0(D-I-3) 1 11 9 6 3 7 4 2 10 8 5 ( 42 )  
 1(D-D-3) 1 11 9 7 4 3 5 2 10 8 6 ( 55 )  
 62 1.9844 1 11 9 7 4 2 10 8 6 3 5[++++---+]-1000110001 0(S-D-3) 1(S-I-3)  
 63 1.98647 1 11 9 7 5 2 10 8 6 3 4[++++---+]-1000010001 0(D-I-3) 1 11 10 8 6 3 5 2 9 7 4 ( 69 )  
 1(D-D-3) 1 11 10 8 6 3 4 2 9 7 5 ( 70 )  
 64 1.98748 1 11 10 8 6 2 9 7 4 3 5[++++---+]-1000010011 0(D-D-3) 1 11 10 9 6 3 7 4 2 8 5 ( 66 )  
 1(D-I-3) 1 11 10 9 7 4 3 5 2 8 6 ( 73 )  
 65 1.98838 1 11 10 8 5 2 9 6 3 7 4[++++---+]-1000010010 0(S-I-3)  
 1(D-D-3) 1 11 10 9 7 4 3 6 2 8 5 ( 74 )  
 66 1.9892 1 11 10 9 6 3 7 4 2 8 5[++++---+]-1000010110 0(D-D-3) 1 11 10 8 6 2 9 7 4 3 5 ( 64 )  
 1(D-I-3) 1 11 10 9 8 5 2 7 4 3 6 ( 75 )  
 67 1.98999 1 11 10 9 7 2 8 4 5 3 6[++++---+]-1000010111 0(S-I-4)  
 1(D-D-4) 1 11 10 9 8 4 5 3 6 2 7 ( 72 )  
 68 1.99075 1 11 10 9 7 3 6 2 8 4 5[++++---+]-1000010101 0(S-D-4)  
 1(D-I-4) 1 11 10 9 8 4 5 2 7 3 6 ( 71 )  
 69 1.99149 1 11 10 8 6 3 5 2 9 7 4[++++---+]-1000010100 0(D-I-3) 1 11 9 7 5 2 10 8 6 3 4 ( 63 )  
 1(D-D-3) 1 11 10 9 7 4 2 8 6 3 5 ( 76 )  
 70 1.99213 1 11 10 8 6 3 4 2 9 7 5[++++---+]-1000011100 0(D-D-3) 1 11 9 7 5 2 10 8 6 3 4 ( 63 )  
 1(D-I-3) 1 11 10 9 7 4 2 8 6 3 5 ( 76 )  
 71 1.99281 1 11 10 9 8 4 5 2 7 3 6[++++---+]-1000011101 0(D-I-4) 1 11 10 9 7 3 6 2 8 4 5 ( 68 )  
 1(S-D-4)  
 72 1.99344 1 11 10 9 8 4 5 3 6 2 7[++++---+]-1000011111 0(D-D-4) 1 11 10 9 7 2 8 4 5 3 6 ( 67 )  
 1(S-I-4)  
 73 1.99405 1 11 10 9 7 4 3 5 2 8 6[++++---+]-1000011110 0(D-I-3) 1 11 10 8 6 2 9 7 4 3 5 ( 64 )  
 1(D-D-3) 1 11 10 9 8 5 2 7 4 3 6 ( 75 )  
 74 1.99461 1 11 10 9 7 4 3 6 2 8 5[++++---+]-1000011010 0(D-D-3) 1 11 10 8 5 2 9 6 3 7 4 ( 65 )  
 1(S-I-3)  
 75 1.99516 1 11 10 9 8 5 2 7 4 3 6[++++---+]-1000011011 0(D-I-3) 1 11 10 9 6 3 7 4 2 8 5 ( 66 )  
 1(D-D-3) 1 11 10 9 7 4 3 5 2 8 6 ( 73 )  
 76 1.99567 1 11 10 9 7 4 2 8 6 3 5[++++---+]-1000011001 0(D-D-3) 1 11 10 8 6 3 5 2 9 7 4 ( 69 )  
 1(D-I-3) 1 11 10 8 6 3 4 2 9 7 5 ( 70 )  
 77 1.99618 1 11 9 7 5 3 2 10 8 6 4[++++---+]-1000011000 0(S-I-2) 1(S-D-2)  
 78 1.99657 1 11 10 8 6 4 2 9 7 5 3[++++---+]-1000001000 0(S-D-2)  
 1(D-I-2) 1 11 10 9 7 5 3 2 8 6 4 ( 85 )  
 79 1.99702 1 11 10 9 7 5 2 8 6 3 4[++++---+]-1000001001 0(D-I-3) 1 11 10 9 8 6 3 5 2 7 4 ( 81 )  
 1(D-D-3) 1 11 10 9 8 6 3 4 2 7 5 ( 82 )  
 80 1.99742 1 11 10 9 8 6 2 7 4 3 5[++++---+]-1000001011 0(S-D-3)  
 1(D-I-3) 1 11 10 9 8 7 4 3 5 2 6 ( 83 )  
 81 1.99779 1 11 10 9 8 6 3 5 2 7 4[++++---+]-1000001010 0(D-I-3) 1 11 10 9 7 5 2 8 6 3 4 ( 79 )  
 1(D-D-3) 1 11 10 9 8 7 4 2 6 3 5 ( 84 )

82 1.99813 1 11 10 9 8 6 3 4 2 7 5[+++++---]1000001110 0(D-D-3) 1 11 10 9 7 5 2 8 6 3 4 ( 79 )  
 1(D-I-3) 1 11 10 9 8 7 4 2 6 3 5 ( 84 )  
 83 1.99844 1 11 10 9 8 7 4 3 5 2 6[+++++---]1000001111 0(D-I-3) 1 11 10 9 8 6 2 7 4 3 5 ( 80 )  
 1(S-D-3)  
 84 1.99872 1 11 10 9 8 7 4 2 6 3 5[+++++---]1000001101 0(D-D-3) 1 11 10 9 8 6 3 5 2 7 4 ( 81 )  
 1(D-I-3) 1 11 10 9 8 6 3 4 2 7 5 ( 82 )  
 85 1.99898 1 11 10 9 7 5 3 2 8 6 4[+++++---]1000001100 0(D-I-2) 1 11 10 8 6 4 2 9 7 5 3 ( 78 )  
 1(S-D-2)  
 86 1.9992 1 11 10 9 8 6 4 2 7 5 3[+++++---]1000000100 0(S-D-2)  
 1(D-I-2) 1 11 10 9 8 7 5 3 2 6 4 ( 89 )  
 87 1.9994 1 11 10 9 8 7 5 2 6 3 4[+++++---]1000000101 0(S-I-3)  
 1(D-D-3) 1 11 10 9 8 7 6 3 4 2 5 ( 88 )  
 88 1.99957 1 11 10 9 8 7 6 3 4 2 5[+++++---]1000000111 0(D-D-3) 1 11 10 9 8 7 5 2 6 3 4 ( 87 )  
 1(S-I-3)  
 89 1.99971 1 11 10 9 8 7 5 3 2 6 4[+++++---]1000000110 0(D-I-2) 1 11 10 9 8 6 4 2 7 5 3 ( 86 )  
 1(S-D-2)  
 90 1.99983 1 11 10 9 8 7 6 4 2 5 3[+++++---]1000000010 0(S-D-2)  
 1(D-I-2) 1 11 10 9 8 7 6 5 3 2 4 ( 91 )  
 91 1.99991 1 11 10 9 8 7 6 5 3 2 4[+++++---]1000000011 0(D-I-2) 1 11 10 9 8 7 6 4 2 5 3 ( 90 )  
 1(S-D-2)  
 92 1.99997 1 11 10 9 8 7 6 5 4 2 3[+++++---]1000000001 0(S-D-2) 1(S-I-2)  
 93 2 1 11 10 9 8 7 6 5 4 3 2[+++++---]1000000000 0(S-I-1) 1(S-D-1)

----- Order of rotation sequence = 12 , Number of rotation sequences = 170 -----

1 1.41698 1 12 6 7 3 10 4 9 2 11 5 8[+---+---]10111010101 0(S-I-6) 1(S-D-6)  
 2 1.48093 1 12 6 7 4 9 2 11 5 8 3 10[+---+---]10111110111 0(D-I-6) 1 12 6 7 5 8 3 10 2 11 4 9 ( 3 )  
 1(S-D-6)  
 3 1.51245 1 12 6 7 5 8 3 10 2 11 4 9[+---+---]10111110101 0(S-D-6)  
 1(D-I-6) 1 12 6 7 4 9 2 11 5 8 3 10 ( 2 )  
 4 1.53006 1 12 6 7 5 8 4 9 2 11 3 10[+---+---]10111111101 0(S-I-6) 1(S-D-6)  
 5 1.54109 1 12 6 7 5 8 4 9 3 10 2 11[+---+---]10111111111 0(S-D-6) 1(S-I-6)  
 6 1.61297 1 12 7 4 9 2 11 6 5 8 3 10[+---+---]10111010111 0(S-I-5) 1(S-D-5)  
 7 1.64128 1 12 8 3 10 2 11 6 5 7 4 9[+---+---]10110101111 0(S-D-5)  
 1(D-I-5) 1 12 9 2 11 6 5 7 4 8 3 10 ( 10 )  
 8 1.66964 1 12 7 3 10 4 9 2 11 6 5 8[+---+---]10110101011 0(S-I-5)  
 1(D-D-5) 1 12 8 2 11 6 5 7 3 10 4 9 ( 11 )  
 9 1.67877 1 12 7 3 10 5 8 2 11 6 4 9[+---+---]10110111011 0(S-D-5)  
 1(D-I-5) 1 12 8 2 11 6 5 7 3 10 4 9 ( 11 )  
 10 1.69885 1 12 9 2 11 6 5 7 4 8 3 10[+---+---]10110111111 0(D-I-5) 1 12 8 3 10 2 11 6 5 7 4 9 ( 7 )  
 1(S-D-5)  
 11 1.70484 1 12 8 2 11 6 5 7 3 10 4 9[+---+---]10110111101 0(D-D-5) 1 12 7 3 10 4 9 2 11 6 5 8 ( 8 )  
 1(D-I-5) 1 12 7 3 10 5 8 2 11 6 4 9 ( 9 )  
 12 1.71797 1 12 7 2 11 6 4 9 3 10 5 8[+---+---]10110110101 0(S-I-5)  
 1(D-D-5) 1 12 8 2 11 7 3 10 5 6 4 9 ( 13 )  
 13 1.72598 1 12 8 2 11 7 3 10 5 6 4 9[+---+---]10110110111 0(D-D-5) 1 12 7 2 11 6 4 9 3 10 5 8 ( 12 )  
 1(S-I-5)  
 14 1.77827 1 12 8 4 9 5 2 11 7 3 10 6[+---+---]10010110010 0(D-I-4) 1 12 9 5 4 7 2 11 8 3 10 6 ( 47 )  
 1(D-D-4) 1 12 10 6 3 8 2 11 9 5 4 7 ( 46 )  
 15 1.78918 1 12 8 4 9 5 3 10 6 2 11 7[+---+---]10010110110 0(D-D-4) 1 12 10 6 3 9 5 4 8 2 11 7 ( 54 )  
 1(D-I-4) 1 12 11 7 2 10 6 3 9 5 4 8 ( 55 )  
 16 1.79975 1 12 9 2 11 7 3 10 5 6 4 8[+---+---]10010110111 0(D-I-5) 1 12 9 3 10 5 7 2 11 6 4 8 ( 22 )  
 1(D-D-5) 1 12 10 5 6 4 8 2 11 7 3 9 ( 37 )  
 17 1.80495 1 12 8 2 11 6 4 9 3 10 5 7[+---+---]10010110101 0(D-D-5) 1 12 9 3 10 4 8 2 11 6 5 7 ( 23 )  
 1(D-I-5) 1 12 10 5 7 3 9 2 11 6 4 8 ( 34 )

18 1.81448 1 12 9 2 11 6 5 7 3 10 4 8[+-+-----]10010111101 0(D-I-5) 1 12 10 3 9 2 11 6 5 7 4 8 ( 26 )  
 1(D-D-5) 1 12 10 4 8 2 11 6 5 7 3 9 ( 31 )  
 19 1.81797 1 12 10 2 11 6 5 7 4 8 3 9[+-+-----]10010111111 0(S-D-5)  
 1(D-I-5) 1 12 11 6 5 7 4 8 3 9 2 10 ( 40 )  
 20 1.82192 1 12 9 3 10 5 6 4 7 2 11 8[+-+-----]10010111110 0(D-I-5) 1 12 10 5 6 4 7 3 9 2 11 8 ( 38 )  
 1(D-D-5) 1 12 11 8 2 10 5 6 4 7 3 9 ( 52 )  
 21 1.82361 1 12 9 3 10 5 6 4 8 2 11 7[+-+-----]10010111010 0(S-D-5)  
 1(D-I-5) 1 12 11 7 3 9 2 10 5 6 4 8 ( 49 )  
 22 1.82759 1 12 9 3 10 5 7 2 11 6 4 8[+-+-----]10010111011 0(D-I-5) 1 12 9 2 11 7 3 10 5 6 4 8 ( 16 )  
 1(D-D-5) 1 12 11 6 4 8 2 10 5 7 3 9 ( 43 )  
 23 1.83697 1 12 9 3 10 4 8 2 11 6 5 7[+-+-----]10010101011 0(D-D-5) 1 12 8 2 11 6 4 9 3 10 5 7 ( 17 )  
 1(D-I-5) 1 12 11 6 5 7 3 9 2 10 4 8 ( 42 )  
 24 1.84047 1 12 9 4 8 3 10 5 7 2 11 6[+-+-----]10010101010 0(S-I-5)  
 1(D-D-5) 1 12 11 6 3 9 4 8 2 10 5 7 ( 50 )  
 25 1.84211 1 12 9 4 8 3 10 5 6 2 11 7[+-+-----]10010101110 0(D-D-5) 1 12 10 5 6 3 9 4 8 2 11 7 ( 33 )  
 1(D-I-5) 1 12 11 7 2 10 5 6 3 9 4 8 ( 51 )  
 26 1.84528 1 12 10 3 9 2 11 6 5 7 4 8[+-+-----]10010101111 0(D-I-5) 1 12 9 2 11 6 5 7 3 10 4 8 ( 18 )  
 1(D-D-5) 1 12 11 6 5 7 4 8 2 10 3 9 ( 41 )  
 27 1.84804 1 12 9 4 8 2 11 6 3 10 5 7[+-+-----]10010101101 0(S-D-5)  
 1(D-I-5) 1 12 10 5 7 2 11 6 3 9 4 8 ( 30 )  
 28 1.85644 1 12 9 4 7 2 11 8 3 10 5 6[+-+-----]10010100101 0(S-I-5)  
 1(D-D-5) 1 12 10 5 6 3 8 2 11 9 4 7 ( 35 )  
 29 1.86572 1 12 10 5 6 2 11 8 3 9 4 7[+-+-----]10011100101 0(S-D-5)  
 1(D-I-5) 1 12 10 5 6 3 8 2 11 9 4 7 ( 35 )  
 30 1.87318 1 12 10 5 7 2 11 6 3 9 4 8[+-+-----]10011101101 0(D-I-5) 1 12 9 4 8 2 11 6 3 10 5 7 ( 27 )  
 1(S-D-5)  
 31 1.87537 1 12 10 4 8 2 11 6 5 7 3 9[+-+-----]10011101111 0(D-D-5) 1 12 9 2 11 6 5 7 3 10 4 8 ( 18 )  
 1(D-I-5) 1 12 11 6 5 7 4 8 2 10 3 9 ( 41 )  
 32 1.87768 1 12 10 5 6 3 9 4 7 2 11 8[+-+-----]10011101110 0(S-I-5)  
 1(D-D-5) 1 12 11 7 2 10 5 6 3 9 4 8 ( 51 )  
 33 1.87909 1 12 10 5 6 3 9 4 8 2 11 7[+-+-----]10011101010 0(D-D-5) 1 12 9 4 8 3 10 5 6 2 11 7 ( 25 )  
 1(D-I-5) 1 12 11 6 3 9 4 8 2 10 5 7 ( 50 )  
 34 1.88134 1 12 10 5 7 3 9 2 11 6 4 8[+-+-----]10011101011 0(D-I-5) 1 12 8 2 11 6 4 9 3 10 5 7 ( 17 )  
 1(D-D-5) 1 12 11 6 5 7 3 9 2 10 4 8 ( 42 )  
 35 1.8838 1 12 10 5 6 3 8 2 11 9 4 7[+-+-----]10011101001 0(D-D-5) 1 12 9 4 7 2 11 8 3 10 5 6 ( 28 )  
 1(D-I-5) 1 12 10 5 6 2 11 8 3 9 4 7 ( 29 )  
 36 1.88584 1 12 10 5 6 4 7 2 11 9 3 8[+-+-----]10011111001 0(S-I-5) 1(S-D-5)  
 37 1.88817 1 12 10 5 6 4 8 2 11 7 3 9[+-+-----]10011111011 0(D-D-5) 1 12 9 2 11 7 3 10 5 6 4 8 ( 16 )  
 1(D-I-5) 1 12 11 6 4 8 2 10 5 7 3 9 ( 43 )  
 38 1.89015 1 12 10 5 6 4 7 3 9 2 11 8[+-+-----]10011111010 0(D-I-5) 1 12 9 3 10 5 6 4 7 2 11 8 ( 20 )  
 1(D-D-5) 1 12 11 7 3 9 2 10 5 6 4 8 ( 49 )  
 39 1.8914 1 12 10 5 6 4 7 3 8 2 11 9[+-+-----]10011111110 0(S-D-5)  
 1(D-I-5) 1 12 11 8 2 10 5 6 4 7 3 9 ( 52 )  
 40 1.89321 1 12 11 6 5 7 4 8 3 9 2 10[+-+-----]10011111111 0(D-I-5) 1 12 10 2 11 6 5 7 4 8 3 9 ( 19 )  
 1(S-D-5)  
 41 1.89481 1 12 11 6 5 7 4 8 2 10 3 9[+-+-----]10011111101 0(D-D-5) 1 12 10 3 9 2 11 6 5 7 4 8 ( 26 )  
 1(D-I-5) 1 12 10 4 8 2 11 6 5 7 3 9 ( 31 )  
 42 1.89903 1 12 11 6 5 7 3 9 2 10 4 8[+-+-----]10011110101 0(D-I-5) 1 12 9 3 10 4 8 2 11 6 5 7 ( 23 )  
 1(D-D-5) 1 12 10 5 7 3 9 2 11 6 4 8 ( 34 )  
 43 1.90063 1 12 11 6 4 8 2 10 5 7 3 9[+-+-----]10011110111 0(D-D-5) 1 12 9 3 10 5 7 2 11 6 4 8 ( 22 )  
 1(D-I-5) 1 12 10 5 6 4 8 2 11 7 3 9 ( 37 )  
 44 1.90244 1 12 9 5 4 6 3 10 7 2 11 8[+-+-----]10011110110 0(D-I-4) 1 12 10 6 3 9 5 4 7 2 11 8 ( 53 )  
 1(D-D-4) 1 12 11 7 2 10 6 3 9 5 4 8 ( 55 )  
 45 1.90384 1 12 9 5 4 6 2 11 8 3 10 7[+-+-----]10011110010 0(S-D-4)  
 1(D-I-4) 1 12 10 6 3 8 2 11 9 5 4 7 ( 46 )



46	1.9074	1 12 10 6 3 8 2 11 9 5 4 7[+---+---]10011010011	0(D-D-4) 1 12 8 4 9 5 2 11 7 3 10 6 ( 14 )
			1(D-I-4) 1 12 9 5 4 6 2 11 8 3 10 7 ( 45 )
47	1.91074	1 12 9 5 4 7 2 11 8 3 10 6[+---+---]10011010010	0(D-I-4) 1 12 8 4 9 5 2 11 7 3 10 6 ( 14 )
			1(S-D-4)
48	1.9121	1 12 9 5 4 8 3 10 6 2 11 7[+---+---]10011010110	0(S-D-4)
			1(D-I-4) 1 12 10 6 3 9 5 4 8 2 11 7 ( 54 )
49	1.91376	1 12 11 7 3 9 2 10 5 6 4 8[+---+---]10011010111	0(D-I-5) 1 12 9 3 10 5 6 4 8 2 11 7 ( 21 )
			1(D-D-5) 1 12 10 5 6 4 7 3 9 2 11 8 ( 38 )
50	1.9152	1 12 11 6 3 9 4 8 2 10 5 7[+---+---]10011010101	0(D-D-5) 1 12 9 4 8 3 10 5 7 2 11 6 ( 24 )
			1(D-I-5) 1 12 10 5 6 3 9 4 8 2 11 7 ( 33 )
51	1.91896	1 12 11 7 2 10 5 6 3 9 4 8[+---+---]10011011101	0(D-I-5) 1 12 9 4 8 3 10 5 6 2 11 7 ( 25 )
			1(D-D-5) 1 12 10 5 6 3 9 4 7 2 11 8 ( 32 )
52	1.9203	1 12 11 8 2 10 5 6 4 7 3 9[+---+---]10011011111	0(D-D-5) 1 12 9 3 10 5 6 4 7 2 11 8 ( 20 )
			1(D-I-5) 1 12 10 5 6 4 7 3 8 2 11 9 ( 39 )
53	1.92173	1 12 10 6 3 9 5 4 7 2 11 8[+---+---]10011011110	0(D-I-4) 1 12 9 5 4 6 3 10 7 2 11 8 ( 44 )
			1(S-D-4)
54	1.92284	1 12 10 6 3 9 5 4 8 2 11 7[+---+---]10011011010	0(D-D-4) 1 12 8 4 9 5 3 10 6 2 11 7 ( 15 )
			1(D-I-4) 1 12 9 5 4 8 3 10 6 2 11 7 ( 48 )
55	1.92431	1 12 11 7 2 10 6 3 9 5 4 8[+---+---]10011011011	0(D-I-4) 1 12 8 4 9 5 3 10 6 2 11 7 ( 15 )
			1(D-D-4) 1 12 9 5 4 6 3 10 7 2 11 8 ( 44 )
56	1.92585	1 12 9 5 3 10 6 2 11 8 4 7[+---+---]10011011001	0(S-D-4) 1(S-I-4)
57	1.92849	1 12 9 5 3 10 7 2 11 8 4 6[+---+---]10011001001	0(D-I-4) 1 12 9 5 2 11 8 4 7 3 10 6 ( 59 )
			1(D-D-4) 1 12 9 6 2 11 8 4 5 3 10 7 ( 60 )
58	1.93007	1 12 10 6 2 11 8 3 9 5 4 7[+---+---]10011001011	0(S-D-4)
			1(D-I-4) 1 12 10 7 2 11 9 5 4 6 3 8 ( 61 )
59	1.93162	1 12 9 5 2 11 8 4 7 3 10 6[+---+---]10011001010	0(D-I-4) 1 12 9 5 3 10 7 2 11 8 4 6 ( 57 )
			1(D-D-4) 1 12 10 6 2 11 9 5 3 8 4 7 ( 62 )
60	1.93288	1 12 9 6 2 11 8 4 5 3 10 7[+---+---]10011001110	0(D-D-4) 1 12 9 5 3 10 7 2 11 8 4 6 ( 57 )
			1(D-I-4) 1 12 10 6 2 11 9 5 3 8 4 7 ( 62 )
61	1.93455	1 12 10 7 2 11 9 5 4 6 3 8[+---+---]10011001111	0(D-I-4) 1 12 10 6 2 11 8 3 9 5 4 7 ( 58 )
			1(S-D-4)
62	1.93632	1 12 10 6 2 11 9 5 3 8 4 7[+---+---]10011001101	0(D-D-4) 1 12 9 5 2 11 8 4 7 3 10 6 ( 59 )
			1(D-I-4) 1 12 9 6 2 11 8 4 5 3 10 7 ( 60 )
63	1.94252	1 12 9 6 3 10 7 4 2 11 8 5[+---+---]10001001100	0(D-D-3) 1 12 10 7 4 3 9 6 2 11 8 5 ( 104 )
			1(D-I-3) 1 12 11 8 5 2 10 7 4 3 9 6 ( 107 )
64	1.94604	1 12 10 7 2 11 9 5 3 8 4 6[+---+---]10001001101	0(D-I-4) 1 12 11 8 4 7 3 9 5 2 10 6 ( 80 )
			1(D-D-4) 1 12 11 8 4 5 3 9 6 2 10 7 ( 86 )
65	1.94762	1 12 10 8 2 11 9 5 4 6 3 7[+---+---]10001001111	0(D-D-4) 1 12 11 8 3 9 5 4 6 2 10 7 ( 73 )
			1(D-I-4) 1 12 11 9 5 4 6 3 7 2 10 8 ( 93 )
66	1.94902	1 12 10 7 2 11 8 4 5 3 9 6[+---+---]10001001110	0(S-I-4)
			1(D-D-4) 1 12 11 9 5 3 8 4 6 2 10 7 ( 100 )
67	1.95011	1 12 10 6 2 11 8 4 7 3 9 5[+---+---]10001001010	0(S-D-4)
			1(D-I-4) 1 12 11 9 5 3 8 4 7 2 10 6 ( 99 )
68	1.95133	1 12 10 7 2 11 8 3 9 5 4 6[+---+---]10001001011	0(D-I-4) 1 12 11 8 3 9 5 4 7 2 10 6 ( 72 )
			1(D-D-4) 1 12 11 9 5 4 6 3 8 2 10 7 ( 94 )
69	1.95249	1 12 10 7 3 9 6 2 11 8 4 5[+---+---]10001001001	0(D-D-4) 1 12 11 8 4 6 2 10 7 3 9 5 ( 81 )
			1(D-I-4) 1 12 11 8 4 5 2 10 7 3 9 6 ( 85 )
70	1.95489	1 12 10 7 3 9 5 2 11 8 4 6[+---+---]10001011001	0(D-I-4) 1 12 10 8 3 7 2 11 9 5 4 6 ( 82 )
			1(D-D-4) 1 12 10 8 4 6 2 11 9 5 3 7 ( 84 )
71	1.95592	1 12 11 8 2 10 6 3 9 5 4 7[+---+---]10001011011	0(S-D-4)
			1(D-I-4) 1 12 11 9 5 4 7 2 10 6 3 8 ( 95 )
72	1.95691	1 12 11 8 3 9 5 4 7 2 10 6[+---+---]10001011010	0(D-I-4) 1 12 10 7 2 11 8 3 9 5 4 6 ( 68 )
			1(D-D-4) 1 12 11 10 6 3 8 2 9 5 4 7 ( 98 )
73	1.95774	1 12 11 8 3 9 5 4 6 2 10 7[+---+---]10001011110	0(D-D-4) 1 12 10 8 2 11 9 5 4 6 3 7 ( 65 )
			1(D-I-4) 1 12 11 10 7 2 9 5 4 6 3 8 ( 101 )

74	1.95866	1 12 11 9 2 10 5 6 4 7 3 8[+++-----]10001011111	0(S-I-5) 1(D-D-5)	1 12 11 10 5 6 4 7 3 8 2 9 ( 92 )
75	1.95953	1 12 11 8 2 10 5 6 3 9 4 7[+++-----]10001011101	0(D-D-5) 1(D-I-5)	1 12 11 9 3 8 2 10 5 6 4 7 ( 79 ) 1 12 11 9 4 7 2 10 5 6 3 8 ( 87 )
76	1.96052	1 12 10 7 3 8 4 5 2 11 9 6[+++-----]10001011100	0(D-I-4) 1(D-D-4)	1 12 10 8 4 5 3 7 2 11 9 6 ( 89 ) 1 12 11 9 6 2 10 8 4 5 3 7 ( 106 )
77	1.961	1 12 10 7 3 8 4 6 2 11 9 5[+++-----]10001010100	0(S-D-4) 1(D-I-4)	1 12 11 9 5 2 10 7 3 8 4 6 ( 105 )
78	1.96196	1 12 11 8 3 9 4 7 2 10 5 6[+++-----]10001010101	0(S-I-5) 1(D-D-5)	1 12 11 10 5 6 3 8 2 9 4 7 ( 88 )
79	1.96279	1 12 11 9 3 8 2 10 5 6 4 7[+++-----]10001010111	0(D-D-5) 1(D-I-5)	1 12 11 8 2 10 5 6 3 9 4 7 ( 75 ) 1 12 11 10 5 6 4 7 2 9 3 8 ( 91 )
80	1.96364	1 12 11 8 4 7 3 9 5 2 10 6[+++-----]10001010110	0(D-I-4) 1(D-D-4)	1 12 10 7 2 11 9 5 3 8 4 6 ( 64 ) 1 12 11 10 6 2 9 5 3 8 4 7 ( 102 )
81	1.96441	1 12 11 8 4 6 2 10 7 3 9 5[+++-----]10001010010	0(D-D-4) 1(D-I-4)	1 12 10 7 3 9 6 2 11 8 4 5 ( 69 ) 1 12 11 9 5 3 7 2 10 8 4 6 ( 97 )
82	1.96532	1 12 10 8 3 7 2 11 9 5 4 6[+++-----]10001010011	0(D-I-4) 1(D-D-4)	1 12 10 7 3 9 5 2 11 8 4 6 ( 70 ) 1 12 11 9 5 4 6 2 10 8 3 7 ( 96 )
83	1.96681	1 12 10 8 4 5 2 11 9 7 3 6[+++-----]10001110001	0(S-I-4) 1(S-D-4)	1 12 10 7 3 9 5 2 11 8 4 6 ( 70 )
84	1.96822	1 12 10 8 4 6 2 11 9 5 3 7[+++-----]10001110011	0(D-D-4) 1(D-I-4)	1 12 11 9 5 4 6 2 10 8 3 7 ( 96 )
85	1.96906	1 12 11 8 4 5 2 10 7 3 9 6[+++-----]10001110010	0(D-I-4) 1(D-D-4)	1 12 10 7 3 9 6 2 11 8 4 5 ( 69 ) 1 12 11 9 5 3 7 2 10 8 4 6 ( 97 )
86	1.96977	1 12 11 8 4 5 3 9 6 2 10 7[+++-----]10001110110	0(D-D-4) 1(D-I-4)	1 12 10 7 2 11 9 5 3 8 4 6 ( 64 ) 1 12 11 10 6 2 9 5 3 8 4 7 ( 102 )
87	1.97051	1 12 11 9 4 7 2 10 5 6 3 8[+++-----]10001110111	0(D-I-5) 1(D-D-5)	1 12 11 8 2 10 5 6 3 9 4 7 ( 75 ) 1 12 11 10 5 6 4 7 2 9 3 8 ( 91 )
88	1.97121	1 12 11 10 5 6 3 8 2 9 4 7[+++-----]10001110101	0(D-D-5) 1(S-I-5)	1 12 11 8 3 9 4 7 2 10 5 6 ( 78 )
89	1.97196	1 12 10 8 4 5 3 7 2 11 9 6[+++-----]10001110100	0(D-I-4) 1(D-D-4)	1 12 10 7 3 8 4 5 2 11 9 6 ( 76 ) 1 12 11 9 5 2 10 7 3 8 4 6 ( 105 )
90	1.97244	1 12 10 8 4 5 3 6 2 11 9 7[+++-----]10001111100	0(S-D-4) 1(D-I-4)	1 12 11 9 6 2 10 8 4 5 3 7 ( 106 )
91	1.97317	1 12 11 10 5 6 4 7 2 9 3 8[+++-----]10001111101	0(D-I-5) 1(D-D-5)	1 12 11 9 3 8 2 10 5 6 4 7 ( 79 ) 1 12 11 9 4 7 2 10 5 6 3 8 ( 87 )
92	1.97382	1 12 11 10 5 6 4 7 3 8 2 9[+++-----]10001111111	0(D-D-5) 1(S-I-5)	1 12 11 9 2 10 5 6 4 7 3 8 ( 74 )
93	1.97448	1 12 11 9 5 4 6 3 7 2 10 8[+++-----]10001111110	0(D-I-4) 1(D-D-4)	1 12 10 8 2 11 9 5 4 6 3 7 ( 65 ) 1 12 11 10 7 2 9 5 4 6 3 8 ( 101 )
94	1.97508	1 12 11 9 5 4 6 3 8 2 10 7[+++-----]10001111010	0(D-D-4) 1(D-I-4)	1 12 10 7 2 11 8 3 9 5 4 6 ( 68 ) 1 12 11 10 6 3 8 2 9 5 4 7 ( 98 )
95	1.97573	1 12 11 9 5 4 7 2 10 6 3 8[+++-----]10001111011	0(D-I-4) 1(S-D-4)	1 12 11 8 2 10 6 3 9 5 4 7 ( 71 )
96	1.97636	1 12 11 9 5 4 6 2 10 8 3 7[+++-----]10001111001	0(D-D-4) 1(D-I-4)	1 12 10 8 3 7 2 11 9 5 4 6 ( 82 ) 1 12 10 8 4 6 2 11 9 5 3 7 ( 84 )
97	1.97799	1 12 11 9 5 3 7 2 10 8 4 6[+++-----]10001101001	0(D-I-4) 1(D-D-4)	1 12 11 8 4 6 2 10 7 3 9 5 ( 81 ) 1 12 11 8 4 5 2 10 7 3 9 6 ( 85 )
98	1.97859	1 12 11 10 6 3 8 2 9 5 4 7[+++-----]10001101011	0(D-D-4) 1(D-I-4)	1 12 11 8 3 9 5 4 7 2 10 6 ( 72 ) 1 12 11 9 5 4 6 3 8 2 10 7 ( 94 )
99	1.97918	1 12 11 9 5 3 8 4 7 2 10 6[+++-----]10001101010	0(D-I-4) 1(S-D-4)	1 12 10 6 2 11 8 4 7 3 9 5 ( 67 )
100	1.97973	1 12 11 9 5 3 8 4 6 2 10 7[+++-----]10001101110	0(D-D-4) 1(S-I-4)	1 12 10 7 2 11 8 4 5 3 9 6 ( 66 )
101	1.9803	1 12 11 10 7 2 9 5 4 6 3 8[+++-----]10001101111	0(D-I-4) 1(D-D-4)	1 12 11 8 3 9 5 4 6 2 10 7 ( 73 ) 1 12 11 9 5 4 6 3 7 2 10 8 ( 93 )

102	1.98085	1 12 11 10 6 2 9 5 3 8 4 7[+++-----]10001101101	0(D-D-4) 1 12 11 8 4 7 3 9 5 2 10 6 ( 80 ) 1(D-I-4) 1 12 11 8 4 5 3 9 6 2 10 7 ( 86 )
103	1.98143	1 12 10 7 4 3 8 5 2 11 9 6[+++-----]10001101100	0(S-I-3) 1(D-D-3) 1 12 11 8 5 2 10 7 4 3 9 6 ( 107 )
104	1.98188	1 12 10 7 4 3 9 6 2 11 8 5[+++-----]10001100100	0(D-D-3) 1 12 9 6 3 10 7 4 2 11 8 5 ( 63 ) 1(S-I-3)
105	1.98245	1 12 11 9 5 2 10 7 3 8 4 6[+++-----]10001100101	0(D-I-4) 1 12 10 7 3 8 4 6 2 11 9 5 ( 77 ) 1(D-D-4) 1 12 10 8 4 5 3 7 2 11 9 6 ( 89 )
106	1.98299	1 12 11 9 6 2 10 8 4 5 3 7[+++-----]10001100111	0(D-D-4) 1 12 10 7 3 8 4 5 2 11 9 6 ( 76 ) 1(D-I-4) 1 12 10 8 4 5 3 6 2 11 9 7 ( 90 )
107	1.98354	1 12 11 8 5 2 10 7 4 3 9 6[+++-----]10001100110	0(D-I-3) 1 12 9 6 3 10 7 4 2 11 8 5 ( 63 ) 1(D-D-3) 1 12 10 7 4 3 8 5 2 11 9 6 ( 103 )
108	1.98409	1 12 10 7 4 2 11 9 6 3 8 5[+++-----]10001100010	0(S-D-3) 1(D-I-3) 1 12 10 8 5 2 11 9 7 4 3 6 ( 109 )
109	1.98475	1 12 10 8 5 2 11 9 7 4 3 6[+++-----]10001100011	0(D-I-3) 1 12 10 7 4 2 11 9 6 3 8 5 ( 108 ) 1(S-D-3)
110	1.98614	1 12 10 8 6 2 11 9 7 4 3 5[++++-----]10000100011	0(D-D-3) 1 12 11 9 6 3 7 4 2 10 8 5 ( 116 ) 1(D-I-3) 1 12 11 9 7 4 3 5 2 10 8 6 ( 131 )
111	1.98675	1 12 10 8 5 2 11 9 6 3 7 4[++++-----]10000100010	0(D-I-3) 1 12 11 9 6 3 8 5 2 10 7 4 ( 115 ) 1(D-D-3) 1 12 11 9 7 4 3 6 2 10 8 5 ( 132 )
112	1.98724	1 12 11 9 6 2 10 7 4 3 8 5[++++-----]10000100110	0(S-D-3) 1(D-I-3) 1 12 11 10 7 4 3 8 5 2 9 6 ( 135 )
113	1.98772	1 12 11 9 7 2 10 8 4 5 3 6[++++-----]10000100111	0(D-I-4) 1 12 11 10 7 3 8 4 5 2 9 6 ( 119 ) 1(D-D-4) 1 12 11 10 8 4 5 3 6 2 9 7 ( 128 )
114	1.98816	1 12 11 9 6 2 10 7 3 8 4 5[++++-----]10000100101	0(D-D-4) 1 12 11 10 7 3 8 4 6 2 9 5 ( 120 ) 1(D-I-4) 1 12 11 10 8 4 5 3 7 2 9 6 ( 127 )
115	1.98861	1 12 11 9 6 3 8 5 2 10 7 4[++++-----]10000100100	0(D-I-3) 1 12 10 8 5 2 11 9 6 3 7 4 ( 111 ) 1(D-D-3) 1 12 11 10 7 4 2 9 6 3 8 5 ( 136 )
116	1.98898	1 12 11 9 6 3 7 4 2 10 8 5[++++-----]10000101100	0(D-D-3) 1 12 10 8 6 2 11 9 7 4 3 5 ( 110 ) 1(D-I-3) 1 12 11 10 8 5 2 9 7 4 3 6 ( 137 )
117	1.9894	1 12 11 10 7 2 9 5 3 8 4 6[++++-----]10000101101	0(D-I-4) 1 12 11 10 8 3 7 2 9 5 4 6 ( 121 ) 1(D-D-4) 1 12 11 10 8 4 6 2 9 5 3 7 ( 126 )
118	1.9898	1 12 11 10 8 2 9 5 4 6 3 7[++++-----]10000101111	0(S-D-4) 1(D-I-4) 1 12 11 10 9 5 4 6 3 7 2 8 ( 129 )
119	1.99019	1 12 11 10 7 3 8 4 5 2 9 6[++++-----]10000101110	0(D-I-4) 1 12 11 9 7 2 10 8 4 5 3 6 ( 113 ) 1(D-D-4) 1 12 11 10 9 6 2 8 4 5 3 7 ( 134 )
120	1.99056	1 12 11 10 7 3 8 4 6 2 9 5[++++-----]10000101010	0(D-D-4) 1 12 11 9 6 2 10 7 3 8 4 5 ( 114 ) 1(D-I-4) 1 12 11 10 9 5 3 7 2 8 4 6 ( 133 )
121	1.99094	1 12 11 10 8 3 7 2 9 5 4 6[++++-----]10000101011	0(D-I-4) 1 12 11 10 7 2 9 5 3 8 4 6 ( 117 ) 1(D-D-4) 1 12 11 10 9 5 4 6 2 8 3 7 ( 130 )
122	1.9913	1 12 11 9 7 3 6 2 10 8 4 5[++++-----]10000101001	0(S-D-4) 1(D-I-4) 1 12 11 10 8 4 5 2 9 7 3 6 ( 125 )
123	1.9917	1 12 10 8 6 3 5 2 11 9 7 4[++++-----]10000101000	0(S-I-3) 1(D-D-3) 1 12 11 9 7 4 2 10 8 6 3 5 ( 138 )
124	1.99193	1 12 10 8 6 3 4 2 11 9 7 5[++++-----]10000111000	0(S-D-3) 1(D-I-3) 1 12 11 9 7 4 2 10 8 6 3 5 ( 138 )
125	1.99231	1 12 11 10 8 4 5 2 9 7 3 6[++++-----]10000111001	0(D-I-4) 1 12 11 9 7 3 6 2 10 8 4 5 ( 122 ) 1(S-D-4)
126	1.99265	1 12 11 10 8 4 6 2 9 5 3 7[++++-----]10000111011	0(D-D-4) 1 12 11 10 7 2 9 5 3 8 4 6 ( 117 ) 1(D-I-4) 1 12 11 10 9 5 4 6 2 8 3 7 ( 130 )
127	1.99297	1 12 11 10 8 4 5 3 7 2 9 6[++++-----]10000111010	0(D-I-4) 1 12 11 9 6 2 10 7 3 8 4 5 ( 114 ) 1(D-D-4) 1 12 11 10 9 5 3 7 2 8 4 6 ( 133 )
128	1.99329	1 12 11 10 8 4 5 3 6 2 9 7[++++-----]10000111110	0(D-D-4) 1 12 11 9 7 2 10 8 4 5 3 6 ( 113 ) 1(D-I-4) 1 12 11 10 9 6 2 8 4 5 3 7 ( 134 )

129 1.9936 1 12 11 10 9 5 4 6 3 7 2 8[++++-----]10000111111 0(D-I-4) 1 12 11 10 8 2 9 5 4 6 3 7 ( 118 )  
 1(S-D-4)  
 130 1.9939 1 12 11 10 9 5 4 6 2 8 3 7[++++-----]10000111101 0(D-D-4) 1 12 11 10 8 3 7 2 9 5 4 6 ( 121 )  
 1(D-I-4) 1 12 11 10 8 4 6 2 9 5 3 7 ( 126 )  
 131 1.9942 1 12 11 9 7 4 3 5 2 10 8 6[++++-----]10000111100 0(D-I-3) 1 12 10 8 6 2 11 9 7 4 3 5 ( 110 )  
 1(D-D-3) 1 12 11 10 8 5 2 9 7 4 3 6 ( 137 )  
 132 1.99447 1 12 11 9 7 4 3 6 2 10 8 5[++++---+---]10000110100 0(D-D-3) 1 12 10 8 5 2 11 9 6 3 7 4 ( 111 )  
 1(D-I-3) 1 12 11 10 7 4 2 9 6 3 8 5 ( 136 )  
 133 1.99475 1 12 11 10 9 5 3 7 2 8 4 6[++++---+---]10000110101 0(D-I-4) 1 12 11 10 7 3 8 4 6 2 9 5 ( 120 )  
 1(D-D-4) 1 12 11 10 8 4 5 3 7 2 9 6 ( 127 )  
 134 1.99502 1 12 11 10 9 6 2 8 4 5 3 7[++++---+---]10000110111 0(D-D-4) 1 12 11 10 7 3 8 4 5 2 9 6 ( 119 )  
 1(D-I-4) 1 12 11 10 8 4 5 3 6 2 9 7 ( 128 )  
 135 1.99529 1 12 11 10 7 4 3 8 5 2 9 6[++++---+---]10000110110 0(D-I-3) 1 12 11 9 6 2 10 7 4 3 8 5 ( 112 )  
 1(S-D-3)  
 136 1.99555 1 12 11 10 7 4 2 9 6 3 8 5[++++---+---]10000110010 0(D-D-3) 1 12 11 9 6 3 8 5 2 10 7 4 ( 115 )  
 1(D-I-3) 1 12 11 9 7 4 3 6 2 10 8 5 ( 132 )  
 137 1.9958 1 12 11 10 8 5 2 9 7 4 3 6[++++---+---]10000110011 0(D-I-3) 1 12 11 9 6 3 7 4 2 10 8 5 ( 116 )  
 1(D-D-3) 1 12 11 9 7 4 3 5 2 10 8 6 ( 131 )  
 138 1.99605 1 12 11 9 7 4 2 10 8 6 3 5[++++---+---]10000110001 0(D-D-3) 1 12 10 8 6 3 5 2 11 9 7 4 ( 123 )  
 1(D-I-3) 1 12 10 8 6 3 4 2 11 9 7 5 ( 124 )  
 139 1.99638 1 12 10 8 6 4 2 11 9 7 5 3[+++++-----]10000010000 0(S-D-2)  
 1(D-I-2) 1 12 11 9 7 5 3 2 10 8 6 4 ( 154 )  
 140 1.99669 1 12 11 9 7 5 2 10 8 6 3 4[+++++-----]10000010001 0(D-I-3) 1 12 11 10 8 6 3 5 2 9 7 4 ( 146 )  
 1(D-D-3) 1 12 11 10 8 6 3 4 2 9 7 5 ( 147 )  
 141 1.99691 1 12 11 10 8 6 2 9 7 4 3 5[+++++-----]10000010011 0(D-D-3) 1 12 11 10 9 6 3 7 4 2 8 5 ( 143 )  
 1(D-I-3) 1 12 11 10 9 7 4 3 5 2 8 6 ( 150 )  
 142 1.99712 1 12 11 10 8 5 2 9 6 3 7 4[+++++-----]10000010010 0(S-I-3)  
 1(D-D-3) 1 12 11 10 9 7 4 3 6 2 8 5 ( 151 )  
 143 1.99732 1 12 11 10 9 6 3 7 4 2 8 5[+++++-----]10000010110 0(D-D-3) 1 12 11 10 8 6 2 9 7 4 3 5 ( 141 )  
 1(D-I-3) 1 12 11 10 9 8 5 2 7 4 3 6 ( 152 )  
 144 1.99751 1 12 11 10 9 7 2 8 4 5 3 6[+++++-----]10000010111 0(S-I-4)  
 1(D-D-4) 1 12 11 10 9 8 4 5 3 6 2 7 ( 149 )  
 145 1.9977 1 12 11 10 9 7 3 6 2 8 4 5[+++++-----]10000010101 0(S-D-4)  
 1(D-I-4) 1 12 11 10 9 8 4 5 2 7 3 6 ( 148 )  
 146 1.99788 1 12 11 10 8 6 3 5 2 9 7 4[+++++-----]10000010100 0(D-I-3) 1 12 11 9 7 5 2 10 8 6 3 4 ( 140 )  
 1(D-D-3) 1 12 11 10 9 7 4 2 8 6 3 5 ( 153 )  
 147 1.99805 1 12 11 10 8 6 3 4 2 9 7 5[+++++-----]10000011100 0(D-D-3) 1 12 11 9 7 5 2 10 8 6 3 4 ( 140 )  
 1(D-I-3) 1 12 11 10 9 7 4 2 8 6 3 5 ( 153 )  
 148 1.99821 1 12 11 10 9 8 4 5 2 7 3 6[+++++-----]10000011101 0(D-I-4) 1 12 11 10 9 7 3 6 2 8 4 5 ( 145 )  
 1(S-D-4)  
 149 1.99837 1 12 11 10 9 8 4 5 3 6 2 7[+++++-----]10000011111 0(D-D-4) 1 12 11 10 9 7 2 8 4 5 3 6 ( 144 )  
 1(S-I-4)  
 150 1.99851 1 12 11 10 9 7 4 3 5 2 8 6[+++++-----]10000011110 0(D-I-3) 1 12 11 10 8 6 2 9 7 4 3 5 ( 141 )  
 1(D-D-3) 1 12 11 10 9 8 5 2 7 4 3 6 ( 152 )  
 151 1.99866 1 12 11 10 9 7 4 3 6 2 8 5[+++++-----]10000011010 0(D-D-3) 1 12 11 10 8 5 2 9 6 3 7 4 ( 142 )  
 1(S-I-3)  
 152 1.99879 1 12 11 10 9 8 5 2 7 4 3 6[+++++-----]10000011011 0(D-I-3) 1 12 11 10 9 6 3 7 4 2 8 5 ( 143 )  
 1(D-D-3) 1 12 11 10 9 7 4 3 5 2 8 6 ( 150 )  
 153 1.99892 1 12 11 10 9 7 4 2 8 6 3 5[+++++-----]10000011001 0(D-D-3) 1 12 11 10 8 6 3 5 2 9 7 4 ( 146 )  
 1(D-I-3) 1 12 11 10 8 6 3 4 2 9 7 5 ( 147 )  
 154 1.99904 1 12 11 9 7 5 3 2 10 8 6 4[+++++-----]10000011000 0(D-I-2) 1 12 10 8 6 4 2 11 9 7 5 3 ( 139 )  
 1(S-D-2)  
 155 1.99915 1 12 11 10 8 6 4 2 9 7 5 3[+++++-----]10000001000 0(S-D-2)  
 1(D-I-2) 1 12 11 10 9 7 5 3 2 8 6 4 ( 162 )

156 1.99926 1 12 11 10 9 7 5 2 8 6 3 4[+++++---]10000001001 0(D-I-3) 1 12 11 10 9 8 6 3 5 2 7 4 ( 158 )  
 1(D-D-3) 1 12 11 10 9 8 6 3 4 2 7 5 ( 159 )  
 157 1.99936 1 12 11 10 9 8 6 2 7 4 3 5[+++++---]10000001011 0(S-D-3)  
 1(D-I-3) 1 12 11 10 9 8 7 4 3 5 2 6 ( 160 )  
 158 1.99945 1 12 11 10 9 8 6 3 5 2 7 4[+++++---]10000001010 0(D-I-3) 1 12 11 10 9 7 5 2 8 6 3 4 ( 156 )  
 1(D-D-3) 1 12 11 10 9 8 7 4 2 6 3 5 ( 161 )  
 159 1.99953 1 12 11 10 9 8 6 3 4 2 7 5[+++++---]10000001110 0(D-D-3) 1 12 11 10 9 7 5 2 8 6 3 4 ( 156 )  
 1(D-I-3) 1 12 11 10 9 8 7 4 2 6 3 5 ( 161 )  
 160 1.99961 1 12 11 10 9 8 7 4 3 5 2 6[+++++---]10000001111 0(D-I-3) 1 12 11 10 9 8 6 2 7 4 3 5 ( 157 )  
 1(S-D-3)  
 161 1.99968 1 12 11 10 9 8 7 4 2 6 3 5[+++++---]10000001101 0(D-D-3) 1 12 11 10 9 8 6 3 5 2 7 4 ( 158 )  
 1(D-I-3) 1 12 11 10 9 8 6 3 4 2 7 5 ( 159 )  
 162 1.99975 1 12 11 10 9 7 5 3 2 8 6 4[+++++---]10000001100 0(D-I-2) 1 12 11 10 8 6 4 2 9 7 5 3 ( 155 )  
 1(S-D-2)  
 163 1.9998 1 12 11 10 9 8 6 4 2 7 5 3[+++++---]10000000100 0(S-D-2)  
 1(D-I-2) 1 12 11 10 9 8 7 5 3 2 6 4 ( 166 )  
 164 1.99985 1 12 11 10 9 8 7 5 2 6 3 4[+++++---]10000000101 0(S-I-3)  
 1(D-D-3) 1 12 11 10 9 8 7 6 3 4 2 5 ( 165 )  
 165 1.99989 1 12 11 10 9 8 7 6 3 4 2 5[+++++---]10000000111 0(D-D-3) 1 12 11 10 9 8 7 5 2 6 3 4 ( 164 )  
 1(S-I-3)  
 166 1.99993 1 12 11 10 9 8 7 5 3 2 6 4[+++++---]10000000110 0(D-I-2) 1 12 11 10 9 8 6 4 2 7 5 3 ( 163 )  
 1(S-D-2)  
 167 1.99996 1 12 11 10 9 8 7 6 4 2 5 3[+++++---]10000000010 0(S-D-2)  
 1(D-I-2) 1 12 11 10 9 8 7 6 5 3 2 4 ( 168 )  
 168 1.99998 1 12 11 10 9 8 7 6 5 3 2 4[+++++---]10000000011 0(D-I-2) 1 12 11 10 9 8 7 6 4 2 5 3 ( 167 )  
 1(S-D-2)  
 169 1.99999 1 12 11 10 9 8 7 6 5 4 2 3[+++++---]10000000001 0(S-D-2) 1(S-I-2)  
 170 2 1 12 11 10 9 8 7 6 5 4 3 2[+++++---]10000000000 0(S-I-1) 1(S-D-1)